

Space Nuclear Propulsion for Deep Space Missions



If a nuclear propulsion option existed, what could be done?

Nuclear Thermal Propulsion (NTP)

- Substantial departure thrust (10-15 klb_f thrust), improved specific impulse (900 s I_{sp}) compared to chemical
- Significantly reduced trip times
- Greater payload mass delivery

NTP efforts underway

- NASA Space Nuclear Propulsion Project
- DARPA DRACO in-space demonstration

Nuclear Electric Propulsion (NEP)

- 10 kW_e-class, 2,000-8,000 s I_{sp}
- Greater payload mass delivery
- Power at destination far in excess of radioisotope systems
- Potential for multi-body rendezvous and orbital insertion on one mission

NEP developments and recent risk reduction demos

- Demonstration Using Flattop Fission (DUFF)
- Kilopower Reactor Using Stirling TechnologY (KRUSTY)
- AFRL JETSON in-space demonstration
- NASA Space Nuclear Propulsion Project

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Past and present efforts can be combined & leveraged provide a pathway to low-cost, reliable nuclear propulsion systems for deep space science application.